NOTES BY THE EDITOR.

WIND FORCE IN TORNADOES.

A correspondent asks: "Has any competent observer ever been able to make any estimate which you think would be at all near the truth of what the speed of the wind is in the funnel of a violent tornado?"

The following reply by the Chief of Bureau will be of general interest:

Prof. F. H. Bigelow has published on page 633 International Cloud Report, Vol. II, Report Chief of Bureau 1898–99, the results of his computation on the great waterspout seen off Cottage City, Mass., August 19, 1896. He gives the following additional facts: This large tornado tube or water spout over the ocean was seen from several localities, and the direction noted so that it was easy to place its position on the map with much exactness. At the same time a series of large pictures were photographed by Mr. Chamberlain, of Cottage City, showing the spout in several positions relative to the landscape in the foreground. Professor Bigelow visited the place and made a suitable survey of the distances so that the scale of the photograph was found, and from this the dimensions of the tube and the height of the cloud. By means of the proper formula the following dimensions in feet, and velocity in miles per hour for the different components were obtained:

Height above sea level.	Diameter of tube.	Radial velocity outward.	Rotational velocity.	Vertical velocity upward.
Feet.	*Feet.*	*Miles.*	*Miles.*	*Miles.*
4,200	.....	.....	.....	.....
4,198	3,402	7.0	14.1	0.04
3,901	506	1.0	94.4	2.50
3,599	400	0.6	119.5	3.90
3,301	290	0.6	164.0	7.40
2,999	250	0.5	189.0	9.90
2,398	204	0.4	233.0	14.90
1,802	178	0.4	268.0	19.80
1,499	168	0.3	284.0	22.20
1,201	158	0.3	300.0	24.70
601	144	0.3	328.0	29.60
479	144	0.3	333.0	29.70
0	134	0.3	354.0	34.60

A more thorough study of the data shows that the lower portion of the vortex tube is enlarged over these diameters on account of the friction due to disturbing the water, to the raising of the spray to a height of 500 feet when it is cast out of the tube, and to the indraught of air required to supply the vortex. The effect of this is to increase the size of the tube at the ocean to about 200 feet, and to reduce the rotating velocity to about 300 miles per hour, and the vertical internal draught to about 30 miles per hour. These dimensions and velocities characterize the largest tornado tubes, and together with the fall of internal pressure by the amount of 3 or 4 inches, they readily cause the destructive effects noted so conspicuously at Louisville, Ky., and St. Louis, Mo., in recent years.—*H. H. K.*

A NEW FIELD FOR KITES IN METEOROLOGY.

The following article, by A. Lawrence Rotch, is reprinted from Science, N. S., Vol. XIV, No. 350, pp. 412–413, September 13, 1901:

Although kites carrying recording instruments to a height exceeding three miles have rendered great services to meteorology at Blue Hill and elsewhere, they have been subject to the limitation of requiring a wind that blows at least 12 miles an hour. In certain types of weather, notably anticyclones, the winds are light and consequently observations with kites can rarely be obtained at these times. It also happens frequently that while the wind at the ground is sufficient to raise the kites it fails completely above the cumulus clouds so that the kites are unable to penetrate this calm zone.

By installing the kites and apparatus on a steamship, not only can kites be flown in calm weather, but observations may be made above the oceans where little is known about the conditions of the upper air. It is evident that a vessel steaming 12 knots an hour through a calm atmosphere will raise the kites to the height they would attain in a favorable natural wind, while the force of strong winds can be moderated by steaming with the wind. In this way kites can be flown on board a steamer under almost all conditions and probably more easily than on land, since the steadier winds at sea facilitate launching them. Wherever these observations in the upper air may be made, there is always a station at sea level and not far distant horizontally with which to compare them.

To test the practicability of this method of flying kites, experiments were undertaken on August 22, 1901, with the aid of my assistants, Messrs. Fergusson and Sweetland, upon a towboat chartered for this purpose to cruise in Massachusetts Bay. Anticyclonic weather conditions prevailed and a southeast wind blew from 6 to 10 miles an hour, but at no time with sufficient velocity to elevate the kites, either from sea level or from the summit of Blue Hill. With the boat moving 10 miles an hour toward the wind, and within an angle of 45° on either side of its mean direction, the resultant wind easily lifted the kites and meteorograph with 3,600 feet of wire to the height of half a mile.

While it is desirable to have a vessel that can be started, stopped, and turned at the will of the meteorologist, as was the case in the experiments described, it is nevertheless probable that soundings of the atmosphere can often be made from a steamship pursuing its regular course, and such are about to be attempted by me on a steamer eastward bound across the North Atlantic. Although observations above all the oceans are valuable, the exploration of the equatorial region is the most important, since, with the exception of a few observations on the Andes and on mountains in Central Africa, we know nothing of the conditions existing a mile or two above the equator. The need of such data to complete our theories of the thermo-dynamics and circulation of the atmosphere was urged by the Russian meteorologist, Woeikof, at the Meteorological Congress in Paris last year. North and south of the equator, within the trade wind belts, kites might be employed to determine the height to which the trades extend, and also the direction and strength of the upper winds, concerning which the high clouds, rarely seen in those latitudes, furnish our only information. In order to deduce the velocity recorded at the kite, it is necessary to ascertain the direction of this latter force, which could be done from the orientation of the kite.—*H. H. K.*

WEATHER BUREAU BULLETINS WANTED.

A correspondent desires copies of Bulletins No. 15, 20, 21, 24, and 27 to complete his set. Any person having one or more of these bulletins which he does not care to keep will confer a favor by notifying the Editor.—*H. H. K.*

CLIMATE AND CROPS: A PROBLEM WITH TWO SOLUTIONS.

The following letter was recently received by the Chief of Bureau from Mr. C. M. Donner, Secretary and Treasurer of the Hall's Island Farms, near Seabrook, Beaufort County, S. C.; it submits an interesting problem for consideration:

We have been for the last fifteen years interested in truck farming in this locality, and asparagus culture has been one of our specialties. You are probably aware that asparagus beds are to all intents and purposes permanent, the bushes dying off in the fall and the crop consisting of the new shoots which sprout up from the roots as soon as the temperature of the ground and the air is sufficiently high; our market is in the North, where good prices are paid as long as there is no supply from New Jersey, Long Island, etc. As soon as the more northerly produce appears in the market, prices drop to a level which leaves no profit to the southern grower, owing to the high freight he has to pay, there being no outlet for his produce near by.

You will at once perceive that an early commencement of spring is very necessary to the success of this business, that is to say, early, as compared with the season in the Northern States, as the crop is not harvested at once but brought into market daily, and the harvesting can be continued under favorable circumstances for more than two months; sometimes even three months.

We have a great interest in any apparent change in the climate, and also a good opportunity of observing such changes, as the asparagus plant is a pretty good indicator of the temperature of the air and ground.

Now we have observed that during more than ten years there has evidently, with minor fluctuations, been a steady retardation of what may be called "growing weather," so that whilst in 1890 we cut our first asparagus on January 9, and went on harvesting until after April 30, we only commenced cutting this year on March 21, and shall be very glad if we get more than six weeks altogether in which to ship our crop.

The Weather Bureau having all the necessary data can, of course, decide whether our impressions as to a gradual shifting of the seasons